4.0 Environmental Consequences of Implementing the Proposed Action and the No Action Alternative

The environmental consequences of selecting and implementing a corrective measure option at MDA H within TA-54 are described in the following sections, 4.1 through 4.9. Resources are discussed in the same order as they were presented in Chapter 3.

4.1 Environmental Restoration and Waste Management

4.1.1 No Action Alternative

Under the No Action Alternative, MDA H would not undergo any corrective measure implementation. There would be no effect to waste management facilities at LANL currently receiving wastes.

4.1.2 Proposed Action

Environmental restoration workers at LANL would be involved in any corrective measure option implemented at MDA H. The waste generated by implementing corrective measure Options 1 through 5 would be well within the capability of the existing LANL waste management program. Corrective measure activities at MDA H would decrease the number of LANL mesa-top MDAs requiring remedial action by about 10 percent.

All five corrective measure options would fail to address minor vapor phase transport and contamination already present in the tuff. Even the excavation and removal options would not address this issue because residuals would likely still be present even after complete excavation. Some measure of vapor phase migration of VOCs and tritium would continue under all corrective measure options and the No Action Alternative, but would decrease with time due to bioremediation, decomposition, volatilization, and radioactive decay.

Corrective Measure Option 1: Upgrade Existing Surface

Under corrective measure Option 1, there would be no waste removal from MDA H. There would be no effect to existing waste management systems. No new landfills would be required. Routine monitoring and maintenance activities may produce a very small amount of operational waste from site workers.

Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover

Under corrective measure Option 2, there would be no waste removal from MDA H. The effects for this option are expected to be the same as for corrective measure Option 1. No new landfills would be needed.

Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover

Under corrective measure Option 3, there would be no waste removal from MDA H. There would be no effect to existing waste management systems. No new landfills would be needed.

Corrective measure Options 3a and 3b would produce implementation wastes: uncontaminated borehole cuttings would be stockpiled as crushed tuff for incorporation into the final onsite cap; contaminated drill cuttings would be disposed of in accordance with existing LANL waste management procedures. Routine monitoring and maintenance activities may produce a very small amount of operational waste from site workers.

Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal

Waste types and quantities generated by the excavation and removal of wastes from the MDA H shafts would not be likely to result in substantial effects to existing waste management disposal operations. No new landfills would be required. Under corrective measure Option 4, DOE would pursue maximal offsite disposal of wastes resulting from the implementation of excavation and removal activities. It is expected that the majority of waste produced by corrective measure activities at MDA H would be LLW. The NTS facilities for waste disposal, as well as existing commercial waste disposal facilities in Washington and Utah, have the capacity to accept the waste types and waste volumes expected to be generated by implementation of this corrective measure option. Small amounts of waste generated by site workers during excavation and removal activities would be handled, packaged, and disposed of in the same manner as the wastes generated by other activities at LANL.

About 45,000 yd^3 (34,200 m^3) of clean overburden material would be returned to the MDA H site to be used as backfill material. About 5,000 yd^3 (3,800 m^3) of overburden material (about 10 percent of the total) is likely to be characterized as LLW, hazardous waste, or mixed waste and would require transportation offsite to the NTS for LLW or to existing commercial waste disposal facilities for hazardous or mixed waste. In addition to this volume, an additional 1,500 yd^3 (1,140 m^3) of excavated waste may require transportation offsite to existing commercial waste disposal facilities. About 187,000 lbs (84,150 kg) of LLW DU and an additional 94,000 lbs (42,300 kg) of non-DU LLW of other radionuclides could be shipped offsite from LANL to the NTS or to appropriately licensed commercial facilities such as the above ground engineered disposal cell facility near Clive, Utah. A portion of the lithium compounds, plastics, and graphite (an estimated total of 74,000 lbs [33,300 kg], about 40 yd^3 [30.4 m^3]) may require disposal offsite in a hazardous waste permitted disposal unit. The estimated amount of metal that could be recycled or disposed of in the DOE system, including LANL, is about 129,000 lbs (58,050 kg).

The 5,000 lb (2,250 kg) of HE in the MDA H inventory would be packaged in billets, as described previously, and transported to TA-16 at LANL for deactivation through burning (flashing). After flashing, any residual ash would be sampled, analyzed to ensure that no detonable HE remains, packaged, and sent to Area G for storage and final disposition. Depending on the nature of the HE waste, there may be no ash remaining after flashing.

Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal

Waste types and quantities generated by the excavation and removal of wastes from the MDA H shafts would not be likely to result in substantial effects to existing waste management disposal operations. It is expected that the majority of waste produced by excavation and removal activities under corrective measure Option 5 would be LLW. LLW generated by excavation and removal activities would be disposed of at Area G, TA-54, and would not affect the Area G

operations. Although the current disposal site footprint has limited waste capacity, adequate room for expansion exists within Area G for additional LLW disposal (DOE 1999a). The SWEIS analyzed expansion into Zones 4 and 6 of Area G and DOE made the decision in 1999 to expand LLW disposal at LANL into these areas. Zone 4 is about 30 ac (12 ha), but some of this area would likely not be developed for disposal cells due to the presence of groundwater monitoring wells, a utility easement, and archaeological sites. Zone 6 is slightly less than 40 ac (16 ha). Some of this area may not be developed for disposal cells because the required 50-ft (15-m) setback from the cliff edge may be difficult to attain and still avoid Mesita del Buey Road. Even with these development constraints, the expansion footprint into Areas 4 and 6 would likely be sufficient for as long as 130 years or more of LLW disposal at LANL.

About 45,000 yd^3 (34,200 m^3) of clean overburden material would be returned to the MDA H site to be used as backfill material. About 5,000 yd^3 (3,800 m^3) of overburden material (about 10 percent of the total) is likely to be characterized as LLW, hazardous waste, or mixed waste and would require disposition at Area G for LLW or at existing commercial waste disposal facilities for hazardous and mixed waste. About 187,000 lbs (84,150 kg) of LLW DU and an additional 94,000 lbs (42,300 kg) of non-DU LLW of other radionuclides could be disposed of at Area G. A portion of the lithium compounds, plastics, and graphite (an estimated total of 74,000 lbs [33,300 kg], about 40 yd^3 [30.4 m^3]) may require disposal offsite in a hazardous-waste-permitted disposal unit. The estimated amount of metal that could be recycled or disposed of in the DOE system, including LANL, is about 129,000 lbs (58,050 kg). The 5,000 lb (2,250 kg) of HE in the MDA H inventory would be managed at TA-16, as described in corrective measure Option 4. Any residual ash would be disposed of at Area G.

A portion of the lithium compounds, plastics, and graphite (an estimated total of 74,000 lbs [33,300 kg]) may require disposal offsite in a hazardous-waste-permitted disposal unit. LANL would treat about 4,340 lb (1,953 kg) of waste lithium hydride to remove the hazardous waste characteristics. Successful treatment could result in no regulated hazardous residuals requiring disposal. Residual waste would be discharged to the LANL sanitary wastewater treatment system. Small amounts of waste generated by site workers during excavation and removal activities would be handled, packaged, and disposed of according to LANL's waste management program (LANL 1998a).

4.2 Water Resources (Surface and Ground)

4.2.1 No Action Alternative

Under the No Action Alternative, the MDA H site would be left in its current state. Groundwater and surface water quality would not likely be adversely affected from implementation of the No Action Alternative. Even the more stable and long-lived radionuclides and heavy metals would not be expected to migrate to the regional aquifer within 1,000 years, if at all. Potential water resources effects from implementing the No Action Alternative could include the presence of minor amounts of water in the disposal shafts that could lead to minor migration of contaminants from the disposal shafts.

4.2.2 Proposed Action

Corrective Measure Option 1: Upgrade Existing Surface

It is unlikely that either surface or ground water quality would be adversely affected from implementing this corrective measure option over the next 1,000 years. It is not expected that major contaminant transport over the next 1,000 years would result from implementing this corrective measure option because of chemical and isotope decay and waste material that is non-leaching. Water quality consequences that could result from implementing this corrective measure option include the possibility of minor contaminant transport by groundwater and vapors (LANL 1992b, LASL 1973). Upgrading and maintaining the MDA H surface cover would provide additional protective measures minimizing the amount of moisture that could migrate through the waste materials disposed in the shafts over the No Action Alternative. In addition, the 3-ft- (0.9-m-) thick concrete caps present over each shaft would provide additional moisture protection to the shafts. The gravel and soil admixture would serve to retard erosion of the cover until the vegetative cover is established enough to provide additional erosion control and ET effects.

Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover

It is not expected that either surface or groundwater quality would be adversely affected from implementing this corrective measure option over the next 1,000 years. Environmental effects that could result from implementing this corrective measure option include the possibility of minimal contaminant transport by groundwater and vapors (LANL 1992b, LASL 1973); potential environmental effects from implementing this corrective measure option are also as described above for corrective measure Option 1. The engineered ET cover would likely enhance the performance of the retardation of moisture migration through the shafts and also erosion of the cover over time as compared to corrective measure Option 1.

Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover

It is not expected that either surface or ground water quality would be adversely affected from implementing this corrective measure option over the next 1,000 years. Waste left in place would still be subject to minor contaminant transport by groundwater or vapors (LANL 1992b, LASL 1973). Potential adverse environmental effects from implementation of this corrective measure might result from the potential for an Alkali-Silica Reaction (ASR). This reaction can occur between certain aggregate types (in this case, tuff) and the alkalis in the pore solutions of concrete grout to form a silica gel. If ASR were to occur after implementation, the confinement mechanism of corrective measure Options 3a and 3b could provide little additional physical containment. Although 100 percent integrity of the beneath shaft seal could not be verified, the correct cement mixture formulation would still achieve the primary objective of corrective measure Option 3, to minimize the potential for human and biotic intrusion.

Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal

The long-term effects to water resources that could result from implementing this corrective measure option would likely be slightly beneficial. Total excavation of the inventory of the

MDA H shafts would essentially return this portion of Mesita del Buey to its natural state and would minimize any potential for radionuclide, heavy metal, and organic contaminant transport from wastes present in the shafts at MDA H. Gaseous state contamination in the tuff surrounding the shafts would be expected to self remediate over time.

Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal

The long-term effects to water resources that could result from implementing this corrective measure option would likely be slightly beneficial. Total excavation of the inventory of the MDA H shafts would essentially return this portion of Mesita del Buey to its natural state and would minimize any potential for any radionuclide, heavy metal, and organic contaminant transport from the shafts as the waste would be removed. Gaseous state contamination in the tuff surrounding the shafts would be expected to self remediate over time. Disposal of the waste at another permitted disposal area at LANL could result in the development of the same issues that have necessitated a corrective action at MDA H.

4.3 Air Quality Effects

4.3.1 No Action Alternative

No change to the air quality in the Los Alamos airshed would be expected to result from implementing the No Action Alternative. Under the No Action Alternative, particulates, HAPs, and VOCs would continue to be emitted from MDA H at very low levels similar to current levels. These levels are well below the threshold limits established by the CAA (40 CFR 50). Tritium and VOC emissions would decline over time due to natural bioremediation, decomposition, volatilization, and radioactive decay. LANL would continue to be in compliance with air quality standards and the air quality attainment status of the area would not change.

4.3.2 Proposed Action

Corrective Measure Option 1: Upgrade Existing Surface

No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 1. Air emissions would be expected to be similar to those expected for the No Action Alternative if corrective measure Option 1 were implemented. No MDA H shaft contaminants would be disturbed. Wind erosion at the site would be reduced by the upgrades to the cover of the shaft over conditions of the No Action Alternative. NNSA and UC staff at LANL would continue to be in compliance with air quality standards and the attainment status of the area would not change. Tritium and VOC emissions from MDA H would be similar to, or less than, those associated with the No Action Alternative; VOC and tritium emissions would decline over time as a result of bioremediation, decomposition, volatilization, and radioactive decay.

Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover

No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 2. Air emissions would be expected to be similar to those expected for the No Action Alternative if corrective measure Option 2 were implemented.

No MDA H shaft contaminants would be disturbed. Wind erosion at the site would be reduced by the enhancements to the cover and shaft caps over the conditions of corrective measure Option 1. NNSA and UC staff at LANL would continue to be in compliance with air quality standards and the attainment status of the area would not change. Tritium and VOC emissions from MDA H would be similar to, or less than, those associated with the No Action Alternative. VOC and tritium emissions would decline over time as a result of bioremediation, decomposition, volatilization, and radioactive decay.

Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover

No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 3. Air emissions would be expected to be similar to those expected for the No Action Alternative if corrective measure Option 3 were implemented. Wind erosion at the site would be reduced by the enhancements to the cover and shaft caps, as well as the construction of side walls to the shafts. NNSA and UC staff at LANL would continue to be in compliance with air quality standards and the attainment status of the area would not change. Tritium and VOC emissions from MDA H would be less than those associated with the No Action Alternative. Tritium and VOC emissions would decline over time as a result of bioremediation, decomposition, volatilization, and radioactive decay.

Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal

No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 4. The LANL area would remain an attainment area for air quality. Air emissions would be greater than anticipated for the No Action Alternatives or for corrective measure Options 1 through 3. Emissions would be regulated by NMED and the EPA. Corrective measure operations would conform to applicable NMED and EPA permitting requirements for LANL. Other LANL operations might be curtailed to maintain LANL emissions within permitted levels.

Dust or PM, HAPs, and VOCs would result from excavating, transporting, and storing soil and waste from MDA H over the short term. Particulate emissions would be controlled with specific best available control measures, such as wetting soil or applying tackifiers, that would be implemented for the removal operations. Potential localized air quality effects would be temporary.

Emissions of PM, HAPs, VOCs, and radioactive materials would result from waste segregation and sorting operations, from processes used to declassify materials (particularly from incineration of plastics), and from burning HE-contaminated materials. The volume of HE-contaminated waste that would require treatment at TA-16 is in excess of 5,196 lbs (2,318 kg). Treatment of the entire HE inventory would probably require that the waste treatment be performed over several years for these operations and the rest of LANL operations to remain within the annual emissions parameters of the TA-16 Open Burn Permit.

Bounding estimates for radioactive emissions, using the entire contaminant inventory of the shafts as the source term, for recovering, sorting, segregating, and declassifying materials at MDA H were calculated according to RAD NESHAP (40 CFR 61) protocols. The potential dose

from the recovery and processing operations to the maximally exposed individual (MEI) member of the public, at the White Rock Nazarene Church (which is the nearest permanent offsite residence or business hypothetically located to MDA H), would be 0.26 millirem (mrem) per year if no mitigating measures were employed. However, under the Proposed Action, the recovery, sorting, segregating, and declassification (such as crushing, cutting, dissolving, or heating to temperatures below 3632°F [2000°C]) operations would be conducted in a HEPA-filtered enclosure. The resulting potential dose to the MEI would be 0.017 mrem per year. Radioactive air emissions would be monitored and would not exceed applicable air quality standards. No long-term adverse effects to air quality from implementing corrective measure Option 4 would be expected to occur. Contaminants already present in the soil around MDA H would continue to decay or be decomposed and would lessen over time.

Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal

Air emissions resulting from implementing corrective measure Option 5 would be the same as those expected from implementing corrective measure Option 4. No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 5. The LANL area would remain an attainment area for air quality. Potential doses from emissions of radioactive material and hazardous wastes are expected to be the same as for corrective measure Option 4.

4.4 Geology – Environmental Consequences

4.4.1 No Action Alternative

Under the No Action Alternative, the waste would be left in place within the disposal shafts. There would be no effects to geology resources as a result of implementing the No Action Alternative. The waste disposal shafts are located at a suitable distance (about 90 ft [30 m] for the shaft closest to the road break) from the Pajarito Road break (the cliff edge), so that it is expected that they should remain intact for more than 10,000 years. Slope stability would be subject to natural processes such as erosion, landslides, rockfalls, rainfalls, freezing and thawing, and seismic events. These mass-wasting mechanisms could cause cliff edge instability and retreat towards the disposal shafts over time, but would be unlikely to adversely affect waste within MDA H shafts over the next 10,000 years or more.

4.4.2 Proposed Action

Corrective Measure Option 1: Upgrade Existing Surface

Under this corrective measure option, the waste would be left in place within the disposal shafts. Potential geologic effects on corrective measure Option 1 are the same as those expected for the No Action Alternative.

Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover

Under this corrective measure option, the waste would be left in place within the disposal shafts. Potential geologic effects on corrective measure Option 2 are the same as those expected for the No Action Alternative.

Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover

Under this corrective measure option, the waste would be left in place within the disposal shafts. Potential geologic effects on corrective measure Option 3 are the same as those expected for the No Action Alternative.

Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal

Total excavation of the MDA H shafts would essentially return this portion of Mesita del Buey to its natural state. A minor geologic effect would be expected from implementation of this corrective measure option. The shafts that would be backfilled with the soil and tuff overburden material would not be solid ground and would be susceptible to subsidence (settling) unless the tuff is packed well as it is put into the shafts.

Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal

Total excavation of the MDA H shafts would essentially return this portion of Mesita del Buey to its natural state. Geologic effects expected to result from implementation of this corrective measure option would be similar to those described for corrective measure Option 4.

4.5 Human Health

4.5.1 No Action Alternative

Under the No Action Alternative, there would be no potential for injuries to LANL or site workers from waste removal or site maintenance activities as would be the case under the corrective measure options considered for the Proposed Action. No exposures to earthmoving and excavation activities, site barrier or encapsulation work, or hazardous waste management operations (including radioactive materials and HE) would take place at MDA H. Wastes would not be transported from the MDA H site to either an onsite or an offsite TSD facility.

The current design of the MDA H cover has been reliable and effective in preventing releases of wastes (with the exception of subsurface vapor releases of VOCs and tritium) from the shafts at MDA H. This cover has had minimal maintenance in its 40-year lifetime. Contaminant transport modeling of the effectiveness of the existing cover demonstrated that no contaminants would be expected to reach the regional groundwater table beneath MDA H during the 1,000-year evaluation period. If an episodic event, such as a severe climate change, were to occur, the site would be inspected and monitored to detect any potential releases from the shafts.

4.5.2 Proposed Action

Based on the results of the long-term risk assessments conducted for corrective measure Options 1, 2, and 3 at MDA H, potential human health effects related to cancer risk from chemicals, systemic hazard from chemicals, and radiation dose from radionuclides would be minimal even beyond the point in time when institutional controls were removed after 100 years. The physical nature of the disposed material and the presence of a crushed tuff and gravel mulch cover provide substantial protection to human receptors under both residential and recreational land use

scenarios. Therefore, the implementation of this containment corrective measure option would be expected to provide protection of human health over a 1,000-year time period.

Corrective measure Options 2 and 3 are variations of corrective measure Option 1 with additional controls designed to enhance system performance. Therefore, corrective measure Options 2 and 3 would be less likely to affect human health, if implemented. Corrective measure Options 1, 2, and 3 would provide minimum exposure to workers. No local long-term potential human health effects would be associated with corrective measure Options 4 and 5 because the material in the MDA H shafts would be removed and disposed of in permitted facilities or recycled, where appropriate. There could be human health effects associated with implementing these Proposed Action options based on construction risks. These potential effects are discussed below.

Corrective Measure Option 1: Upgrade Existing Surface

Routine hazardous waste site corrective actions conducted under corrective measure Option 1 would pose very minor adverse health risks to LANL workers. Potential adverse effects could range from relatively minor (such as cuts or sprains) to major (such as broken bones, excessive exposures, or fatalities). To reduce the risk of serious injuries, all site corrective action contractors would be required to submit and adhere to a Health and Safety Plan. In addition, LANL staff would provide site-specific hazard and radiological training to workers, as needed.

Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover

Human health effects under corrective measure Option 2 would be essentially the same as those discussed under corrective measure Option 1. Routine hazardous waste site corrective actions conducted under corrective measure Option 2 could pose very minor adverse health risks to LANL workers.

Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover

Human health effects under corrective measure Option 3 would be similar to those discussed under corrective measure Option 1. Site containment activities would be expanded to include waste encapsulation operations including the use of a high-pressure grout delivery line. About 24 to 38 employees would be required during peak encapsulation operations. The use of a high-pressure grout or concrete delivery line could pose an additional physical hazard to site workers during the construction phase of the project. In the event of a line rupture or loss of line control, workers could be injured by the release of grout or concrete under high pressure, from the violent movement of an out-of-control line, or from shrapnel and fragments from the ruptured line. Adherence to safe operating procedures (such as formal start-up and shut-down protocols, designated worker exclusion areas, emergency shut-offs, and operator training) would reduce the risk of serious injuries due to a high-pressure delivery line failure. Longer-term adverse health effects on LANL workers and members of the public from maintenance activities at the site would be reduced even further than under corrective measure Option 1. Very minor adverse health effects would still be possible.

Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal

Under corrective measure Option 4, the waste in MDA H would be removed and sent to a permitted offsite disposal facility. Any such facility would be required to have equivalent performance in terms of protecting human health and the environment as met by corrective measure Options 1 through 3. Thus, corrective measure Option 4 would provide the same level of protection for human health as corrective measure Options 1, 2, and 3, and complies with all standards for protection of human health but to a different community. However, both corrective measure Options 4 and 5 would result in the maximum exposure to workers during waste excavation, sorting, and declassification under both inert atmosphere or ambient air conditions.

Excavation and offsite disposal activities proposed under corrective measure Option 4 would increase the short-term potential for adverse health effects on workers and the public during the removal operations at MDA H. About 75 to 85 employees would be required during peak waste removal operations. Waste and contaminated soil excavation, packaging, and transportation activities are generally more hazardous than site containment operations described under corrective measure Options 1, 2, and 3. Excavation could pose physical hazards from the removal of large amounts of dirt, rock, and wastes. There is also a potential for workers to be struck by falling materials or to experience falls when working in or near excavated trenches. The need for workers, especially heavy equipment operators and truck drivers, to work in proximity to excavated materials may pose additional chemical, radiation, and explosives hazards. Inhalation and ingestion of and dermal contact with contaminated dust could also pose a health hazard to site workers. Adherence to safe work protocols, use of remote handled devices, use of PPE, and the development of safety mitigation (such as monitoring for chemicals, radiation, and HE) would reduce the risk of contaminant exposures or injuries to site workers. Excavation of the MDA H wastes would be complex, but it would be safe due to training and experience of workers and implementation of the Integrated Safety Management process. The safety analysis and authorization basis process would also be a key element in the safe excavation of wastes from the shafts.

Members of the public could be exposed to chemical, radiation, and HE hazards when wastes are removed from the shafts and transported to offsite disposal facilities. On average, about one vehicle per week over 48 months would be loaded with waste and traveling on public roads. The use of road closures when onsite at LANL, the use of public roads designated for the transport of hazardous materials when offsite, and properly packaged wastes and placarded trucks should preclude unplanned exposures or serious adverse health effects to the public.

Under this corrective measure option, no local long-term health effects would occur to LANL workers or members of the local community since the wastes would no longer be present at MDA H. Because the offsite disposal facility would be designed, built, and permitted in accordance with RCRA requirements, long-term health effects from offsite disposal should pose only a minor health risk to the public.

Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal

Under corrective measure Option 5, the waste in MDA H would be removed and disposed of as LLW at Area G at TA-54 or, as appropriate, at a DOE or commercial offsite permitted RCRA-regulated landfill or recycle facilities. Such facilities are required to meet the same human health

criteria of dose, risk, radon flux, and hazard index that have been demonstrated to be met by corrective measure Options 1 through 4. Thus, corrective measure Option 5 would provide the same level of protection for human health as corrective measure Options 1 through 4 and comply with all standards for protection of human health. Corrective measure Option 5 would provide workers with the maximum exposure to contaminants during waste excavation, sorting, and declassification.

Potential human health effects from excavation activities under corrective measure Option 5 would be similar to those identified under corrective measure Option 4. Transportation activities offsite and onsite would pose the same kinds of potential health risks to workers and the public as discussed under corrective measure Option 4. However, the quantity of waste to be hauled offsite would be less than under corrective measure Option 4. Fewer truckloads of waste would decrease the potential exposure of members of the public to hazards related to waste transport.

4.6 Transportation and Utilities

4.6.1 No Action Alternative

Under the No Action Alternative, MDA H would not undergo corrective measure activities. There would be no additional transportation needs or truck transport trips generated by the movement of people, services, goods, and, possibly, wastes related to closure of MDA H. There would be no changes to existing utilities at TA-54 and no changes to the electric power consumption or water consumption at LANL.

4.6.2 Proposed Action

Each of the corrective measure options affects transportation and utilities differently because of equipment and personnel requirements and the amount of excavated materials. The effects are all temporary. All waste requiring offsite disposal would be transported along Pajarito Road and SR 4. Negligible increases in LANL electric and water consumption would occur because of the implementation of any of the corrective measure options considered; work at the site under corrective measure Options 1, 2, and 3 would require few, if any, water trucks for dust suppression, proposed office personnel, and waste removal workers uses. Corrective Measure Options 4 and 5 would require water and electric use over about 48 months of site work but consumption would be minor compared to total LANL energy consumption.

Corrective Measure Option 1: Upgrade Existing Surface

Under corrective measure Option 1, there would be no waste removal from MDA H. There would be no additional truck trips to haul generated waste materials offsite. In the short term, there would be a few construction vehicles used for upgrading the existing cover; the construction vehicles would use Pajarito Road and connecting LANL roads. Peak staffing would be estimated to be 10 to 14 workers. Implementing this corrective measure option would not appreciably affect area traffic because the additional vehicle trips would be a negligible increase on Pajarito Road and connecting roads. Parking would be provided for these vehicles near the project in a manner that would minimize effects on any natural and cultural resources.

Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover

Under corrective measure Option 2, there would be no waste removal from MDA H. Effects on transportation are expected to be the same as those described for corrective measure Option 1.

Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover

Under corrective measure Option 3, there would be no waste removal from MDA H. Effects on transportation are expected to be the same as those described for corrective measure Option 1.

Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal

Under corrective measure Option 4, all waste requiring offsite disposal would be transported via Pajarito Road. It is estimated that a maximum of 1,500 yd^3 (1,140 m^3) of excavated waste, including LLW, recyclable metal, hazardous, and mixed waste, and an additional 5,000 yd^3 (3,800 m^3) of overburden material would be transported on public roads over about 48 months. About 325 to 650 truckloads, depending on their capacity, would be outbound with an equal number of return trips with empty haulers; this would mean, on average, one truck every day or every other day added to the local traffic and offsite road use. Transport of about 5,000 lb (2,250 kg) of HE to TA-16 at LANL would be performed at night in trucks designed especially for this purpose. A study would be performed to evaluate waste quantity shipped at one time, hours of transport, safeguards and security, and possible road closures. Utilities along Mesita del Buey Road would have to be protected or relocated, including the water line supplying Areas G and L.

Peak staffing is estimated to be 75 to 85 personnel. This would not appreciably affect local traffic because the additional trips would be less than a two percent increase on Pajarito Road and connecting roads. Parking would be provided for these vehicles near the project in a manner that would minimize any effects on natural and cultural resources.

Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal

Under corrective measure Option 5, LLW requiring onsite disposal would be transported to Area G via Mesita del Buey Road; HE waste would be transported within LANL to TA-16 via Mesita del Buey Road, Pajarito Road, and West Jemez Road; waste requiring offsite disposal would be transported via Pajarito Road. It is estimated that a maximum of 1,500 yd^3 (1,140 m^3) of excavated waste, including LLW and some hazardous and mixed waste to be treated at LANL, and an additional 5,000 yd^3 (3,800 m^3) of overburden material would be transported on LANL roads over about 48 months. About five to six truckloads of recyclable metal and about four to eight truckloads of hazardous or mixed waste that cannot be treated at LANL may be transported offsite over about 48 months. This would mean about one truckload of waste every three or four months added to the local traffic and offsite road use. About 325 to 650 truckloads, depending on their capacity, would be required with an equal number of return trips with empty haulers; this would mean, on average, one truck every day or every other day added to the traffic within LANL. Transport of about 5,000 lb (2,250 kg) of HE to TA-16 would be performed at night in trucks designed especially for this purpose. A study would be performed to evaluate waste quantity shipped at one time, hours of transport, safeguards and security, and possible road

closures. Utilities along Mesita del Buey Road would have to be protected or relocated, including the water line supplying Areas G and L.

Peak staffing is estimated to be 75 to 85 personnel. Implementing corrective measure Option 5 would not appreciably affect local traffic because the additional trips would be less than a two percent increase on Pajarito Road and connecting roads. Parking would be provided for these vehicles near the project in a manner that would minimize effects on any natural and cultural resources.

4.7 Noise

4.7.1 No Action Alternative

Under the No Action Alternative, ambient noise levels would remain unchanged in the vicinity of MDA H. Environmental noise levels in and around MDA H would be expected to remain below 80 dBA on average.

4.7.2 Proposed Action

Corrective Measure Option 1: Upgrade Existing Surface

Under corrective measure Option 1, the Proposed Action could result in a temporary increase in noise levels associated with various remediation activities proposed for MDA H over the six-month time period required for implementation. At the completion of these activities, noise levels would return to existing levels. Noise generated by the Proposed Action is not expected to have an adverse effect on either LANL or site workers or members of the public.

Heavy equipment would be used during site preparation and for earthmoving work. Heavy equipment such as front-end loaders and backhoes would produce intermittent noise levels at around 73 to 94 dBA at 50 ft (15 m) from the work site under normal working conditions (Canter 1996, Magrab 1975). Truck traffic would occur frequently, but would generally produce noise levels below that of the heavy equipment. PPE would be required if site-specific work produced noise levels above the action level at LANL of 82 dBA. Based upon a number of physical features that can attenuate noise, such as topography or vegetation, noise levels should return to background levels within about 200 ft (66 m) of the noise source (Canter 1996). Since sound levels would be expected to dissipate to background levels before reaching publicly accessible areas or undisturbed wildlife habitats, they should not be particularly noticeable to members of the public or disturb local wildlife.

Noise generated by activities under this corrective measure option would be temporary (up to six months), of low to moderate intensity, highly localized, and would be consistent with noise levels in nearby developed areas or on existing roads at LANL. No adverse or long-term effects on workers at LANL, the public, or the environment would be expected from noise levels generated by activities planned under this corrective measure option.

Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover

Noise effects under corrective measure Option 2 would be essentially the same as those discussed previously under corrective measure Option 1. Routine site containment activities would include the construction of an engineered cover, but these operations would continue to have only a temporary and minor effect on noise levels.

Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover

Temporary noise effects under corrective measure Option 3 would be greater than those discussed under corrective measure Option 1 during the 12-month implementation period. Routine site containment activities would be expanded to include waste encapsulation operations including the use of a high-pressure slurry delivery line. The use of a high-pressure delivery line and supporting equipment could pose an additional noise hazard to site workers. Equipment required to maintain pressure and push the grout through the delivery line (such as engines or pumps) would generate noise. Workers in the vicinity of this equipment may be exposed to elevated noise levels requiring hearing protection. Adherence to safe operating procedures (such as designated worker exclusion areas, use of PPE, and operator training) should preclude serious injuries from noise exposures associated with grout line operations. Noise levels would return to background levels when grouting operations are completed.

Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal

Excavation and offsite disposal activities proposed under corrective measure Option 4 would increase the potential for noise effects on workers and the public over the 48-month implementation period. Waste excavation, packaging, and transportation activities would generate similar types of noise but also a higher noise level than site containment operations described under corrective measure Option 1. This higher noise level may require hearing protection for workers under certain conditions but should not adversely affect the public. Worksite monitoring for noise, adherence to safe work protocols, and the use of PPE should reduce the risk of injuries to site workers from elevated noise levels.

Traffic noise from waste transportation activities would not noticeably increase the present traffic noise level on roads at LANL. This corrective measure option would add about two additional truck round trips per week over 48 months to existing vehicular traffic at LANL. Therefore, traffic noise levels are not expected to have an adverse effect on LANL workers or the public.

Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal

Potential noise effects from excavation and transportation activities under corrective measure Option 5 would be similar to those identified under corrective measure Option 4. Excavation activities at MDA H would pose potential noise risks to workers and the public as discussed under corrective measure Option 4. However, onsite disposal at a location other than MDA H (such as at Area G or TA-16) would be by way of DOE and public roads. These roads could be closed when wastes are transported thereby reducing noise levels on publicly accessible roads. The total number of truck trips required to move wastes to a landfill or disposal site would not

change. If materials are disposed of at Area G, the transportation of wastes over publicly accessible roads may not be needed, which would also reduce or eliminate public exposure to noise.

4.8 Environmental Justice

4.8.1 No Action Alternative

There would likely be no short-term disproportionate adverse effects to minority populations subject to environmental justice concerns under the No Action Alternative. No long-term issues regarding environmental justice would be expected as a result of implementing the No Action Alternative. Residents of San Ildefonso Pueblo have expressed concern that waste disposed of at TA-54 poses a possible environmental justice concern because this technical area is adjacent to their sacred lands. As discussed in Sections 4.1, 4.2, and 4.3, implementation of any of these corrective measure options would not be expected to adversely affect air or water quality or result in any contaminant releases above regulatory limits for a period of at least 1,000 years.

4.8.2 Proposed Action

Corrective Measure Option 1: Upgrade Existing Surface

Under corrective measure Option 1, there would be no waste removal from MDA H. Environmental justice effects would be the same as those for the No Action Alternative.

Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover

Under corrective measure Option 2, there would be no waste removal from MDA H. Environmental justice effects would be the same as those for the No Action Alternative.

Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover

Under corrective measure Option 3, there would be no waste removal from MDA H. Environmental justice effects would be the same as those for the No Action Alternative.

Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal

No long-term issues regarding environmental justice would be expected as a result of implementing corrective measure Option 4. Transporting wastes from LANL to another location would require that trucks use roads that traverse or are located near minority and low-income communities, including the Pueblos of San Ildefonso and Pojoaque, and possibly others depending upon the selected route to a disposal site. Implementation of corrective measure Option 4 would minimize the potential of possible future releases of contamination from MDA H.

Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal

No long-term issues regarding environmental justice would be expected as a result of implementing corrective measure Option 5. Transporting wastes from LANL to another location

would require that trucks use roads that traverse or are located near minority and low-income communities, including the Pueblos of San Ildefonso and Pojoaque, and possibly others depending upon the selected route to a disposal site. Users of the San Ildefonso Sacred Lands north of TA-54 would not be affected by implementation of corrective measure Option 5 since onsite LLW disposal at Area G is a normal, routine operation.

4.9 Socioeconomics

4.9.1 No Action Alternative

The population in Los Alamos County would not be expected to change as a result of implementing the No Action Alternative. Site maintenance and monitoring activities would be performed by existing LANL workers. There would be no increase in LANL employees and no effect on housing and public services.

4.9.2 Proposed Action

Corrective Measure Option 1: Upgrade Existing Surface

Socioeconomic effects for corrective measure Option 1 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 10 to 12 workers during the six-month implementation time period would be filled by existing LANL workers.

Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover

Socioeconomic effects for corrective measure Option 2 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 10 to 12 workers during the six-month implementation time period would be filled by existing LANL workers.

Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover

Socioeconomic effects for corrective measure Option 3 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 24 to 38 workers during the 12-month implementation time period would be filled by regional workers.

Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal

Socioeconomic effects for corrective measure Option 4 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 75 to 85 workers during the 48-month implementation time period would be filled by regional workers.

Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal

Socioeconomic effects for corrective measure Option 5 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 75 to 85 workers during the 48-month implementation time period would be filled by regional workers.